

Remarks

This Amendment is in response to the Office Action dated March 1, 2004. Claims 4, 34, 36 and 45-49 have been amended. Claims 1-3, 6-29, 31 and 44 have been canceled without prejudice. New claims 50-52 have been added. Claims 4-5, 30, 32-43 and 45-52 are currently pending. Reexamination and reconsideration are respectfully requested.

Claims 4 and 47 have been amended to address certain informalities as suggested by the Examiner.

Claims 38-41 and 46 were rejected under 35 U.S.C. 112, first paragraph. The Examiner stated that the specification does not provide reasonable enablement for claims 38-41 and 46. The Examiner also stated that for claims 38, 41 and 46, "it is unclear how a non-monocrystal silicon etch stop layer can be removed from the side surfaces of the silicon nitride polishing stopper layer upon the step of etching the silicon nitride polishing stopper layer (see Fig. 7 and accompanying text)." The rejection is respectfully traversed.

While the Examiner cited the specification at Fig. 7 and its accompanying text, applicant respectfully requests that the Examiner review the specification at pages 16-18 and Figs. 25-31, which applicant believes provides adequate support for claims 38-41 and 46.

Claims 4, 44-45 and 47-48 were rejected under U.S.C. 102(b) as unpatentable over U.S. Patent No. 5,387,540 to Poon et al. ("Poon"). The rejection is respectfully traversed.

Applicant respectfully submits that the Examiner's citation to Poon do not appear to describe "a sacrificial oxide layer" as recited in claim 4. The Examiner cited no portion of Poon that describes removing the layer 42 (which Examiner referred to as sacrificial oxide layer) as in claim 4, as amended, which recites in part "removing the sacrificial layer."

Moreover, the Examiner's citation to Poon does not appear to describe or suggest a method "wherein the etching stopper layer is formed to have an upper surface that is positioned no higher than an upper surface of the sacrificial oxide layer" as recited in claim 4. Instead, the layer 52 (referred to in Poon at col. 4, line 67-68 as the "remaining portion 52 of second trench liner 50) appears to be formed to have an upper surface that is positioned higher than the layer 42 (which the Examiner referred to as sacrificial oxide layer).

Furthermore, the Examiner appeared to cite no portion of Poon that describes or suggests

a method including "after the sacrificial oxide is formed, implanting an impurity into the substrate, and then removing the sacrificial oxide layer, wherein after the sacrificial oxide is removed, the insulating layer has an upper surface that is positioned higher than an upper surface of the etching stopper layer" as recited in claim 4.

Claim 44 has been canceled.

Claim 45 has been amended to depend from claim 46, which has been rewritten in independent form, and is in patentable form for at least the same reasons as claim 46.

Regarding claim 47, applicant respectfully submits that the Examiner's citations to Poon do not describe or suggest a method including "performing at least one ion implantation into the substrate through the oxide layer; and etching the oxide layer and the insulation layer after the at least one ion implantation, wherein the etching is controlled so that the insulation layer extends to a level higher than that of the substrate" as recited in claim 47. Accordingly, the rejection of claim 47 should be withdrawn. Claim 48 depends from claim 47 and has been amended for clarity. Applicant respectfully submits that for at least the same reasons as claim 47, the rejection of claim 48 should be withdrawn.

Claim 5 was rejected under 35 U.S.C. 103(a) as unpatentable over Poon in view of U.S. Patent No. 6,329,266 to Hwang et al. ("Hwang"). The rejection is respectfully traversed. Claim 5 depends from claim 4. The Examiner's citation to Hwang does not appear to overcome the deficiencies of Poon as discussed above for claim 4. Accordingly, for at least the same reasons as for claim 4, applicant respectfully requests that the rejection of claim 5 be withdrawn.

Claims 32-34, 36-37, 42-43 and 49 were rejected under 35 U.S.C. 103(a) as unpatentable over Poon in view of U.S. Patent No. 5,976,951 to Huang et al. ("Huang"). The rejection is respectfully traversed.

The Examiner stated on page 6 of the Office Action that Poon fails to teach several aspects of the claimed invention relating to features related to implanting an impurity and etching the insulating layer thereafter. The Examiner then cited Huang Figs. 5-6. These Figs. appear to show that after the implantation, the trench isolation layer 106 is etched to a level that is equal to the level of the substrate 100. Thus, the combination of Huang with Poon as suggested by the Examiner does not appear to describe a method as recited in claim 32, which recites in part "after the implanting the impurity into the second region, etching the second portion of the insulating

layer, wherein the etching is controlled so that the second portion of the insulating layer extends to a level above that of the upper surface of the substrate." Accordingly, applicant respectfully requests that the rejection of claim 32 be withdrawn. Claim 33 depends from claim 32 and the rejection of claim 33 should be withdrawn for at least the same reasons as claim 32.

Regarding claim 34, applicant respectfully submits for the similar reasons as described above for claim 32, the Examiner's citations do not describe or suggest a method including "etching the insulation layer after the at least one ion implantation so that the insulation layer extends to a level higher than that of the silicon substrate" as recited in claim 34, as amended. Accordingly, the rejection of claim 34 should be withdrawn. Claim 35 depends from claim 34 and the rejection of claim 33 should be withdrawn for at least the same reasons as claim 34.

Regarding claim 36, applicant respectfully submits that the Examiner's citations to the art do not describe or suggest a method including "etching the sacrificial oxide layer and the insulation layer after the at least one ion implantation, wherein the etching is controlled so that the insulation layer extends to a level higher than that of the silicon substrate" as recited in claim 36, as amended. Accordingly, the rejection of claim 36 should be withdrawn. Claims 37 and 42-43 depend from claim 36 and the rejection of claims 37 and 42-43 should be withdrawn for at least the same reasons as claim 36.

Regarding claim 49, which depends from claim 48, which depends from claim 47, applicant respectfully submits that the Examiner's citations to Poon and Huang do not describe or suggest the method of claim 47 for at least similar reasons as noted above for claim 36. Accordingly, the rejection of claim 49 should be withdrawn.

Claims 30 and 35 were rejected under 35 U.S.C. 103(a) as unpatentable over Poon and Huang and further in view of U.S. Patent No. 4,952,524 to Lee et al. ("Lee"). The rejection is respectfully traversed. Claim 30 depends from claim 32. The Examiner's citation to Lee does not appear to overcome the deficiencies of the combination of Poon and Huang art as described above for claim 32. Accordingly, for at least the same reasons as claim 32, the rejection of claim 30 should be withdrawn. Claim 35 depends from claim 34. The Examiner's citation to Lee does not appear to overcome the deficiencies of the combination of Poon and Huang art as described above for claim 34. Accordingly, for at least the same reasons as claim 34, the rejection of claim 35 should be withdrawn.

New dependent claims 50-52 have been added. Support for these claims may be found throughout the specification and figures, for example, the specification at pages 16-18 and Figs. 25-31. It is believed that no new matter has been entered. Examination of the new claims is respectfully requested.

The Office Action also included various comments concerning the art and the non-patentability of features in various of the above mentioned claims. The discussion above has directly addressed some of those comments and the Examiner's other comments are deemed moot at this time in view of this response.

Applicant respectfully submits that the pending claims are in patentable form for at least the reasons stated above. Reexamination and reconsideration are respectfully requested. If, for any reason, the application is not in condition for allowance, the Examiner is requested to telephone the undersigned to discuss the steps necessary to place the application into condition for allowance.

Respectfully submitted,



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June 1, 2004
(Date)